CLAIMS

1. A display device for displaying a three dimensional image such that different views are displayed according to the viewing angle, the display device including:

a display panel (20) having a plurality of separately addressable pixels ($p_{-7}...p_{22}$) for displaying said image, the pixels being grouped such that different pixels in a group (21) correspond to different views of the image, each pixel in a group being positioned relative to a respective discrete light source (22) and each pixel being separately controllable to vary an optical characteristic of each pixel to generate an image according to received image data;

wherein the sizes of the pixels within a group vary as a function of the viewing angle of the pixels with respect to the respective light source.

2. The display device of claim 1 in which the sizes of the pixels within a group (21) increase with increasing viewing angle.

3. The display device of claim 1 in which the sizes of the pixels within a group (21) increase nonlinearly with increasing viewing angle.

4. The display device of claim 2 in which the increasing pixel sizes within a group (21) are adapted to render the angular size of view of the respective light source (22) independent of the viewing angle.

5. The display device of claim 2 or claim 3 in which the increasing pixel sizes within a group (21) are adapted to substantially normalise the intensities displayed by each pixel in the group so as to be independent of viewing angle.

6. The display device of any preceding claim in which each pixel group (21) includes a central pixel (0, 15) positioned to correspond to zero viewing angle.

7. The display device of claim 6 in which the pixel sizes in a group (21) increase either side of the central pixel (0, 15).

8. The display device of claim 7 in which the pixel sizes increase symmetrically on either side of the central pixel (0, 15).

9. The display device of any preceding claim in which the pixel sizes within a group (21) increase according to the function:

$$0.5h[\tan((n + 1)\,\Delta\phi_{eye}) - \tan((n - 1)\,\Delta\phi_{eye})]$$

where n is the pixel position from the central pixel (0, 15) of the group, h is the orthogonal separation of the light source to the plane of the group of pixels and $\Delta\phi_{eye}$ is the angular separation between the left and right human eye, wherein $\Delta\phi_{eye}$ approximates to arctan (s/d), where s is the average inter-ocular spacing between the left and right eyes and d is the viewing distance between the viewer and the display device.

10. The display device of claim 1 or claim 9 further including a back panel (11) for providing a plurality of said discrete light sources (14, 22), each group (21) of pixels in the display panel (20) being positioned to receive light from a respective one of the discrete light sources.

11. The display device of claim 10 in which the back panel (11) provides a plurality of line sources of illumination.

12. The display device of claim 10 in which the back panel (11) provides a plurality of point sources of illumination.

13. The display device of any preceding claim further including a display driver (52) for controlling said optical characteristic of each pixel within a group.

14. The display device of claim 11 or claim 12 in which the display panel (20) is a light-transmissive display panel adapted for viewing from a side opposite to the side on which the back panel (11) is located.

15. The display device of claim 1 further including a lenticular array (120) positioned adjacent to the display panel (20), each lenticle (121) within the array focusing light from selected pixels in the display panel.

16. The display device of claim 15 in which each lenticle (121) within the array (120) is associated with a said group (116) of pixels.

17. The display device of any preceding claim in which the optical characteristic is a light transmission characteristic and the display driver (52) is adapted to control the amount of light passing through each pixel according to an image to be displayed.

18. The display device of any preceding claim in which the inherent optical characteristics of the display panel (20) are configured such that viewing angle dependence is reduced or substantially minimised relative to the y-axis.

19. The display device of claim 17 incorporated into an object, in which the y-axis is defined as the vertical axis when the object is in normal use.

20. A method for displaying a three dimensional image on a display device such that different views of the image are displayed according to the viewing angle, the method comprising the step of:

processing image data to form pixel intensity data values for each one of a plurality of separately addressable pixels ($P_{-7}...P_{22}$) in a display panel (20), the pixels being grouped such that different pixels in a group (21) correspond to different views of the image, and each pixel in a group being positioned relative to a respective discrete light source (22), the pixel intensity data values each for controlling an optical characteristic of a respective pixel to generate the image;

wherein the sizes of the pixels within a group vary as a function of the viewing angle of the pixels with respect to the respective light source.

21. The method of claim 20 in which the pixel sizes within a group (21) are varied by increasing at least one of a linear or areal dimension of the pixels.

22. the method of claim 21 in which the pixel sizes within a group (21) are selected to render the angular size of view of the respective light source (22) independent of the viewing angle.

23. The method of claim 21 or claim 22 in which the pixel sizes within a group (21) are selected to substantially normalise intensities displayed by each pixel in the group so as to be independent of viewing angle.

24. The method of claim 20 in which the optical characteristic is a light transmission characteristic and a display driver (52) is adapted to control the amount of light passing through each pixel according to an image to be displayed.

25. The method of any one of claims 20 to 24 further including the step of configuring the inherent optical characteristics of the display panel (20)

such that viewing angle dependence is reduced or substantially minimised relative to the y-axis.

26. The method of claim 25 in which the y-axis is the vertical axis when the display panel (20) is in normal use.

27. Apparatus substantially as described herein with reference to the accompanying drawings.

28. A method substantially as described herein with reference to the accompanying drawings.